Standardized Analytical Methods for Chemical Laboratory Response to Public Health Emergencies

Version 1.0



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Abbreviations and Acronyms

123TCP 1,2,3-Trichloropropane

CAS# Chemical Abstracts Service Registry Number CDC Centers for Disease Control and Prevention

DBCP 1,2-Dibromo-3-chloropropane

EDB 1,2-Dibromoethane

EDTA Ethylene Diamine Tetra-Acetic acid
EPA Environmental Protection Agency
FBI Federal Bureau of Investigations

FTIR Fourier Transform Infrared Spectrometry

GB Sarin

GC-MS Gas Chromatography-Mass Spectrometer

GD Soman

GF Cyclohexyl-Sarin HazMat Hazardous Materials

IBL Idaho Bureau of Laboratories

ICP-MS Inductively Coupled Plasma-Mass Spectrometer
LC-MS/MS Liquid Chromatography-Tandem Mass Spectrometer

QA Quality Assurance

SOP Standard Operating Procedure

StateComm Idaho EMS State Communications Center

WMD Weapons of Mass Destruction

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Section 1.0: Laboratory Utilization Guidance

1.1 Overview of Emergency Laboratory Operations

The Idaho Bureau of Laboratories (IBL) conducts routine analysis Monday through Friday, 8:00 AM to 5:00 PM. In general, a credible threat or field screening that indicates a potential health hazard must exist before IBL will accept and analyze specimens on nights, weekends, or holidays. IBL management and on-call personnel are authorized to accept samples for the tests described in this document as long as samples are appropriately screened, collected, and packaged. Events that would require tests not described in this document (i.e. non-routine tests and sample matrices) will require IBL management and analysts to develop a quality assurance (QA) plan prior to agreeing to test the sample. The emergency development of QA plans and documentation of deviation from standard operating procedures (SOP) can greatly delay analytical results but these actions are necessary to maximize the legal defensibility of data. If IBL decides that it is not qualified or capable of providing a required analysis, laboratory staff may be able to assist with sample referral upon request.

1.2 Emergency Communication and Reporting

Formal communication between agencies will occur through the Idaho EMS State Communications Center (StateComm). An on-call IBL representative participates in all StateComm bridge calls involving potential weapons of mass destruction (WMD). For non-WMD events, a call participant must request that the StateComm specialist pages the on-call laboratory representative to join the bridge call. StateComm bridge calls are necessary so that IBL can talk to the all of the response partners involved in order to gather a complete threat assessment and to fully understand testing needs.

During the StateComm call, the representative of the agency that "owns" the sample must be clearly identified. The sample owner will provide information on intake and testing priority. The sample owner will decide if follow-up StateComm calls are necessary to discuss preliminary or final test results. After tests are complete, the sample owner will either accept custody of the remaining sample or authorize disposal by IBL. In general, final test reports will be faxed or e-mailed to StateComm for distribution to the sample owner and other authorized report recipients. IBL may send official reports directly to the sample owner in cases involving confidential patient information.

Prior to accepting a sample, response partners must provide IBL with a comprehensive threat assessment. StateComm call participants must divulge any chemical or biological safety concerns related to the case. For environmental samples, hazardous materials (HazMat) response teams (e.g. regional HazMat, 101st WMD-Civil Support Team, Federal Bureau of Investigations (FBI) HazMat, etc.) must describe the results of biological, chemical, radiological, and explosive field tests. Copies of field screening

tests and results, including Fourier-transform infrared spectrometry (FTIR) spectra, must be submitted to IBL with the samples.

1.3 General Sampling, Packaging, and Handling Requirements

Test-specific requirements are included in the following pages. All samples submitted to IBL must be triple packed. The sample must be collected in a leakproof or siftproof receptacle. The primary receptacle labels should clearly have, at minimum, the case ID or the collector's sample identification number, the sampling location, the date and time of collection, and the collector's name or initials. Primary receptacles should be separated from each to avoid contact (i.e. use gridded boxes, bubble wrap, absorbent material, etc). Secondary packaging that is used to contain primary receptacles must also be leakproof or siftproof. Cushioning should be used in the secondary packaging to protect the primary receptacles. Evidence or tamper-evident tape should be used on primary or secondary packaging. For liquids a sufficient amount of absorbent material must be included around the primary receptacles or within the secondary packaging to absorb the entire volume should the primary container break or leak. Outer packaging must be an adequate size and must include an itemized list of contents. The list of contents should be sealed in a plastic bag. The outside of the box must be labeled according to the relevant transportation regulations.

Submission of samples requires completion of test-specific submission forms that are available from IBL. During emergencies, IBL can provide clients with a submission form by fax or e-mail. Submission forms must be filled out completely to ensure that accurate customer information is obtained by IBL. The sample submitter should include any special requirements for the samples (e.g. Save at least 5 g of material in the original primary receptacle; Minimize handling of the envelope within the primary receptacle to allow for future trace evidence and fingerprint analysis, etc.). All information printed on labels and submission forms must be legible.

For all emergency response samples, IBL will document the chain of custody from the time that IBL gains responsibility for the samples until the samples are returned to the submitter or disposed of. IBL can continue to document chain of custody on forms submitted with the samples or IBL can initiate an internal form.

It is recommended that the sample collector submits two blank (empty) containers per lot of containers used in sample collection. Blank containers should be handled and packaged in the same manner as those containing samples. Blank containers may be useful if questions arise about contaminants originating from the sample collection containers. Non-contaminated samples (water field blanks, food items, etc) should be submitted when possible for comparison and method checks. Non-contaminated control samples are especially useful in determining positive or negative interferences for food matrices.

District health departments, environmental quality agencies, and HazMat teams are encouraged to develop sampling kits that will satisfy the general and test-specific requirements listed in this document. Kits should include sample submission forms relevant to the organization's sampling responsibilities. Having appropriate sampling materials on hand will help to maintain sample quality and will expedite sample collection. Upon request, IBL can provide emergency response partners with sample collection containers.

1.4 Emergency Sample Analysis

IBL will make every effort to expedite the reporting of test results. Sample testing priority decisions will be based on information gathered during StateComm bridge calls. The turn-around-time from sample receipt to report will depend on the analysis required and the availability of trained staff and necessary supplies. Unexpected equipment malfunction and deviation from SOP may result in significant delays.

1.5 Customer Service

IBL has quality procedures in place for the analysis of agents and matrices listed in the following pages. Further QA information is available upon request for any of these procedures. Recommendations to improve laboratory service and partnerships are encouraged. If a partner organization knows of a test that they would like the state public health laboratory to perform, laboratory management and analysts will work with that partner to develop a safety and QA plan that is agreed upon by all stakeholders. IBL also encourages emergency response partners to include IBL in any biological or chemical exercises that could involve laboratory analysis. Exercise will help the laboratory prepare for real public health threats.

This document contains only those tests performed by IBL that may be useful following homeland security events. IBL performs other tests, not included in this document, that are useful for non-emergency situations.

Section 2.0: Clinical Chemical Analysis

2.1 Arsenic and Selenium

Synonyms: As CAS# 7440-38-2, Se CAS# 7782-49-2 **Method/IBL SOP:** CDC CTL-TMS-2.01 / CT-TMS-As&Se

Acceptable Matrices: Urine

Analysis Overview: Arsenic and selenium are measured by ICP-MS.

Sampling, Packaging, and Handling: Specimens are accepted from district health departments. Other healthcare organizations can submit specimens to IBL with referral through their region's district health department. The optimal urine specimen volume is 4-7 mL. Minimal amount required is 2 mL. Acceptable specimen containers are plastic with screw cap (do not overfill). Specimens should be stored for short periods at 2-4 °C. Long-term storage and transport should be at \leq -20 °C (use of dry ice during shipment is preferred when possible).

2.2 Cyanide

Synonyms: HCN CAS# 74-90-8

Method/IBL SOP: CDC CTL-CN-1.02 / CT-CN

Acceptable Matrices: Blood

Analysis Overview: Cyanide in measured by GC-MS.

Sampling, Packaging, and Handling: Specimens are accepted from district health departments. Other healthcare organizations can submit specimens to IBL with referral through their region's district health department. The optimal amount of specimen is at least 5 mL, with a minimum required volume of 0.75 mL. Specimens must be collected in vacutainers containing EDTA as the anticoagulant agent. Heparin may also be used. Headspace in the vacutainers should be minimized if possible. Specimens must be stored and transported at 5 ± 3 °C.

2.3 Mercury, Lead, and Cadmium

Synonyms: See table below for isotopes measured and CAS#

Method/IBL SOP: CDC CTL-CN-1.02 / CT-HgPbCd

Acceptable Matrices: Blood

Analysis Overview: Mercury, lead, and cadmium is measured by ICP-MS.

Element	Isotopes Measured	Elemental CAS#
Mercury (Hg)	199 + 200 + 201 + 202	7439-97-6
Lead (Pb)	206 + 207 + 208	7439-92-1
Cadmium (Cd)	114	7440-43-9

Sampling, Packaging, and Handling: Specimens are accepted from district health departments. Other healthcare organizations can submit specimens to IBL with referral through their region's district health department. The optimal amount of specimen is 1-2 mL with a minimum required volume of 0.25 mL. Specimens must be collected in evacuated blood tubes with EDTA anticoagulant (tubes with royal blue closures, certified for heavy metal/trace element analysis, are highly recommended). Draw the blood through a stainless steel needle. If more than one evacuated tube of blood is to be drawn from an individual, the trace metals tube should be drawn second or later. Specimens must be stored and transported at 5 ± 3 °C.

2.4 Multiple Toxic Elements

Synonyms: Toxic Elements, Trace Elements, Metals, Heavy Metals

Method/IBL SOP: CTL-TMS-1.01 / CT-TMS

Acceptable Matrices: Urine

Analysis Overview: Multiple toxic elements are measured by ICP-MS.

Element	Isotopes Measured	Elemental CAS#
Beryllium (Be)	9	7440-41-7
Cobalt (Co)	59	7440-48-4
Molybdenum (Mo)	98	7439-98-7
Cadmium (Cd)	114	7440-43-9
Antimony (Sb)	121	7440-36-0
Cesium (Cs)	133 (non-radioactive)	7440-46-2
Barium (Ba)	138	7440-39-3
Tungsten (W)	184	7440-33-7
Platinum (Pt)	195	7440-06-4
Thallium (TI)	205	7440-28-0
Lead (Pb)	206 + 207 + 208	7439-92-1
Uranium (U)	235 + 238	7440-61-1

Sampling, Packaging, and Handling: Specimens are accepted from district health departments. Other healthcare organizations can submit specimens to IBL with referral through their region's district health department. Optimal urine specimen volume is 4-7 mL. Minimal amount required is 2 mL. Acceptable specimen containers are plastic with screw cap (do not overfill). Short-term storage of specimens at 2-4 °C is adequate. Long-term storage and transport of specimens should be at temperatures ≤ -20 °C.

2.5 Organophosphate Nerve Agent Metabolites

Synonyms:

Method/IBL SOP: CTL-TMS-1.01 / CT-TMS

Acceptable Matrices: Urine

Analysis Overview: Metabolites of VX, russian-VX, sarin (GB), soman (GD) and cyclohexyl-sarin (GF) are measured by liquid chromatography with a tandem mass spectrometer (LC-MS/MS).

Sampling, Packaging, and Handling: The optimal amount of specimen is at least 5 mL. The minimal amount required is 1.5 mL. Acceptable specimen containers are plastic with screw cap (do not overfill). Samples should be frozen at -70 ± 5 °C as soon as possible and shipped on dry ice.

2.6 Rapid Toxic Screen

Synonyms: RTS

Method/IBL SOP: CDC guidance referenced below.

Acceptable Matrices: Blood and Urine

Analysis Overview: IBL can assist healthcare facilities with referral of specimens to the Centers for Disease Control and Prevention (CDC) following chemical exposure incidents of national significance. The Rapid Toxic Screen measures 150 chemicals, metabolites and adducts.

Sampling, Packaging, and Handling: See CDC guidance, "Shipping Instructions for Specimens Collected from People Who May Have Been Exposed to Chemical-Terrorism Agents".

Section 3.0: Environmental Chemical Analysis

3.1 Anions (Chloride, Fluoride, and Sulfide)

Synonyms: Inorganic Anions

Method/IBL SOP: EPA 300.0 / IC-300.0

Acceptable Matrices: Aqueous Liquids, Solids

Analysis Overview: Anions are measured by ion chromatography with a conductivity

detector.

Sampling, Packaging, and Handling: Samples must be collected in clean glass or plastic containers. For aqueous liquids, 100 mL is recommended, with a minimum sample size of 10 mL. In cases involving water samples, the inside of the container should be rinsed with the water prior to sample collection. For solid samples, 10 g is recommended, with a minimum sample size of 2 g. At least one field duplicate per site is recommended. Samples should be stored and transported at $4 \pm 2 \text{ °C}$.

3.2 Cyanide

Synonyms: Total Cyanide

Method/IBL SOP: SM 4500-CN-C,D,E / IC-4500-CN

Acceptable Matrices: Aqueous Liquids

Analysis Overview: Total cyanide is measured by spectrophotometry.

Sampling, Packaging, and Handling: Samples must be collected in clean glass or plastic containers. A total of 500 mL is recommended, with a minimum sample volume of 150 mL. Samples should be stored and transported at 4 ± 2 °C.

3.3 1,2-Dibromoethane (EDB), 1,2-Dibromo-3-chloropropane (DBCP), and 1,2,3-Trichloropropane (123TCP)

Synonyms: EDB CAS# 106-93-4, DBCP CAS# 92-12-8, 123 TCP CAS# 92-18-4

Method/IBL SOP: EPA 504.1 / OC-504.1

Acceptable Matrices: Aqueous Liquids

Analysis Overview: EDB, DBCP, and 123TCP are measured by gas chromatography

with an electron capture detector.

Sampling, Packaging, and Handling: Samples must be collected in 40 mL glass vials with screw caps, Teflon-lined septa, and sodium thiosulfate preservative. The vials can be purchased pre-cleaned from a supplier or can be washed with detergent followed by rinsing with tap water and then deionized water. Vials should be dried for an hour in an oven and allowed to cool in a organic solvent-free environment before used for sampling. Preservative can be added to each sampling container as 3 mg of sodium thiosulfate or 75 μ L of a 40 mg/mL sodium thiosulfate solution. A minimum of two samples per site is required. Three samples per site are optimal. Samples must be stored and transported at 4 ± 2 °C.

3.4 Diquat and Paraquat

Synonyms: Diquat CAS# 85-00-7, Paraquat CAS# 1910-42-5

Method/IBL SOP: EPA 549.2 / OC-549.2

Acceptable Matrices: Aqueous Liquids

Analysis Overview: Diquat and paraquat are measured by high performance liquid chromatography with ultraviolet detection. Calcium and magnesium ions in hard water may interfere with this test.

Sampling, Packaging, and Handling: Samples must be collected in 500 mL polyvinyl chloride or high-density polyethylene bottles. Bottles should be amber with screw caps. If amber bottles are not available, the samples should be protected from light. Containers must be washed, rinsed with deionized water, and dried before use. Samples suspected to contain residual chlorine must be preserved with sodium thiosulfate at a final concentration of 100 mg/L. Samples suspected to be biologically active must be preserved by adding sulfuric acid until a pH of 2 is reached. A minimum of one 500 mL bottle per site is required. Two 500 mL bottles per site is optimal. If automatic sampling equipment is used, the equipment must be free of adsorption sites that might extract the sample. Samples must be stored and transported at 4 ± 2 °C.

3.5 Glyphosate

Synonyms: CAS# 1071-83-6, *N*-Phosphonomethyl glycine

Method/IBL SOP: EPA 547 / OC-547

Acceptable Matrices: Aqueous Liquids

Analysis Overview: Glyphosate is measured by high performance liquid chromatography with a fluorescence detector. Due to decomposition in chlorinated water, glyphosate is unlikely to be measured in tap water.

Sampling, Packaging, and Handling: Samples must be collected in 60 mL glass bottles with screw caps, Teflon-lined septa, and 6 mg of sodium thiosulfate preservative. Bottles may be purchased pre-cleaned by a supplier or cleaned with tap water and

detergent followed by rinsing with deionized water prior to use. A minimum of one 60 mL sample per site is required. Two 60 mL samples per site would be optimal. Samples must be stored and transported in the dark at 4 ± 2 °C.

3.6 Metals

Synonyms: Toxic Elements, Trace Elements, See table below for specific analyte names and elemental CAS numbers.

Method/IBL SOP: EPA 200.7 / IC-200.7 or EPA 200.9 / IC-200.9 or EPA 245.1 / IC-245.1 or EPA 200.8 / IC-200.8 or Standard Method 3111 / IC-STM 3111

Acceptable Matrices: Aqueous Liquids, Solids (*)

Analysis Overview: Metals are measured by a variety of analytical methods. Instrumental analysis may include inductively coupled plasma-atomic emission spectrometry (200.7), graphite furnace-atomic absorption (GFAA, 200.9), mercury cold vapor atomic absorption (245.1), or flame atomic absorption (STM 3111). While the CAS numbers in the table are for the element form of each metal, these methods measure the total amount of each metal (i.e. elemental forms or complexes).

Element	Elemental CAS#
Aluminum (AI)*	7429-90-5
Antimony (Sb) *	7440-36-0
Arsenic (As)*	7440-38-2
Barium (Ba) *	7440-39-3
Beryllium (Be)*	7440-41-7
Boron (B)	7440-42-8
Cadmium (Cd) *	7440-43-9
Calcium (Ca) *	7440-70-2
Chromium (Cr) *	7440-47-3
Cobalt (Co) *	7440-48-4
Copper (Cu) *	7440-50-8
Iron (Fe) *	7439-89-6
Lead (Pb) *	7439-92-1
Magnesium (Mg) *	7439-95-4
Manganese (Mn) *	7439-96-5
Mercury (Hg)	7439-97-6
Molybdenum (Mo)	7439-98-7
Nickel (Ni) *	7440-02-0
Selenium (Se)*	7782-49-2
Silver (Ag) *	7440-22-4
Sodium (Na) *	7440-23-5
Thallium (TI)*	7440-28-0
Tin (Sn)*	7440-31-5

Table continued on next page.

Element (Continued)	Elemental CAS# (Continued)
Potassium (K) *	7440-09-7
Strontium (Sr)	7440-24-6
Vanadium (V) *	7440-62-2
Zinc (Zn) *	7440-66-6

Sampling, Packaging, and Handling: Samples must be collected in clean glass or plastic containers. For aqueous liquids, 1 L is recommended, with a minimum sample size of 100 mL. For solid samples, 10 g is recommended with a minimum sample size of 4 g. Liquid samples must be preserved by bringing the sample to pH < 2 with a minimal amount of concentrated nitric acid. If the client is not able to preserve the sample with acid, IBL will preserve samples upon receipt. Liquid samples must be at pH < 2 for at least 16 hours before analysis. Solid samples do not require acid preservation. Samples should be stored and transported at 4 ± 2 °C.

3.7 *N*-Methylcarbamoyloximes and *N*-Methylcarbamates

Synonyms: Carbamates. See table below for specific analyte names and CAS

numbers.

Method/IBL SOP: EPA 531.2 / OC-531.2

Acceptable Matrices: Aqueous Liquids

Analysis Overview: *N*-methylcarbamoyloximes and *N*-methylcarbamates are measured by high performance liquid chromatography with a fluorescence detector.

Analyte	CAS Number
Aldicarb	116-06-03
Aldicarb Sulfone	1646-88-4
Aldicarb Sulfoxide	1646-87-3
Carbaryl	63-25-2
Carbofuran	1563-66-2
3-Hydroxycarbofuran	16655-82-6
Methiocarb	2032-65-7
Methomyl	16752-77-5
1-Napthol	90-15-3
Oxamyl	23135-22-0
Propoxur	114-26-1

Sampling, Packaging, and Handling: Samples must be collected in amber 40 or 60 mL glass bottles with screw caps having Teflon-faced septa. Bottles can be purchased pre-cleaned from a supplier or cleaned with detergent, rinsed with tap water, and then rinsed with deionized water. Avoid touching samples and the inside of containers with bare fingers. Interferences may be caused by contaminants, especially amines and ammonia. A sufficient amount of potassium dihydrogen citrate preservative must be added to each sampling container to yield a final concentration of 9.2 to 9.5 g/L (e.g. 0.55

-0.57 g / 60 mL bottle) and a pH of 4. A sufficient amount of sodium thiosulfate must be added to each sampling container to yield a final concentration in the range of 80 - 320 mg/L (e.g. 4.8 mg - 19.2 mg / 60 mL bottle).

A minimum of two sample filled sample containers are required per site. Three filled sample containers per site are optimal. When collecting grab samples, the collector must be careful to not wash out the preservatives. Containers must not be pre-rinsed with sample before collection. Before sampling tap water, remove the aerator and let the water flow for 3-5 minutes to allow the temperature to stabilize. When sampling from an open body of water, fill a wide-mouth bottle or beaker with the sample and then transfer water to the sample bottles. If automatic samplers are used, they must be free of plastic tubing, gaskets, and other parts that may leach interfering analytes. If the water to be sampled is high in colloidal iron, the sample should be filtered prior to transfer to the preserved sample containers to help prevent the precipitation of iron. After collection, the sample should be agitated by hand for one minute. Samples should be kept sealed until analysis at the laboratory. Samples should be stored and transported at 4 ± 2 °C.

3.8 Phosphorus

Synonyms: Total Phosphorus

Method/IBL SOP: QuikChem 10-115-01-1-F (ATP EPA 365.1) / IC-10-115-01-1-F

Acceptable Matrices: Aqueous Liquids

Analysis Overview: Total phosphorus is measured by flow injection colorimetry. Potential interferences include silica, ferric iron, and contaminated containers (e.g. containers washed with commercial detergents containing phosphate).

Sampling, Packaging, and Handling: Samples must be collected in clean glass or plastic containers. For aqueous liquids, 500 mL is recommended, with a minimum sample size of 100 mL. In cases involving water samples, the inside of the container should be rinsed with reagent water or water from the source prior to sample collection. Samples must be preserved by bringing the sample to pH < 2 with a minimal amount of concentrated sulfuric acid. If the client is not able to preserve the sample with acid, IBL will preserve samples upon receipt. Samples should be stored and transported at 4 ± 2 °C.

3.9 Semi-Volatile Organic Compounds

Synonyms: SVOC, SOC, CAS numbers are listed in the table below.

Method/IBL SOP: EPA 525.2 / OC-525.2

Acceptable Matrices: Aqueous Liquids

Analysis Overview: Semi-volatile organic compounds are measured by gas chromatography-mass spectrometry. This method is applicable to a wide range of organic compounds that are efficiently partitioned from water onto a C18 matrix, and sufficiently

volatile and thermally stable for gas chromatography. Quantitative analysis is available for the compounds in the table below. Qualitative screening for other semi-volatile organic compounds may be possible using this method.

SVOC	CAS#
Acenaphthylene	208-96-8
Alachlor	15972-60-8
Aldrin	309-00-2
Ametryn	834-12-8
Anthracene	120-12-7
Aroclor 1016	12674-11-2
Aroclor 1221	11104-28-2
Aroclor 1232	11141-16-5
Aroclor 1242	53469-21-9
Aroclor 1248	12672-29-6
Aroclor 1254	11097-69-1
Aroclor 1260	11096-82-5
Atraton	1610-17-9
Atrazine	1912-24-9
Benz[a]anthracene	56-55-3
Benzo[b]fluoranthene	205-82-3
Benzo[k]fluoranthene	207-08-9
Benzo[a]pyrene	50-32-8
Benzo[g,h,i]perylene	191-24-2
Bromacil	314-40-9
Butachlor	23184-66-9
Butylate	2008-41-5
Butylbenzylphthalate	85-68-7
Carboxin	5234-68-4
Alpha-chlordane	5103-71-9
Gamma-chlordane	5103-74-2
Trans nonachlor	39765-80-5
Chlorneb	2675-77-6
Chlorobenzilate	510-15-6
Chlorpropham	101-21-3
Chlorothalonil	1897-45-6
Chlorpyrifos	2921-88-2
2-Chlorobiphenyl	2051-60-7
Chrysene	218-01-9
Cyanazine	21725-46-2
Cycloate	1134-23-2
Dacthal(DCPA)	1861-32-1
DDD, 4,4'-	72-54-8

Table continued on next page.

SVOC (Continued)	CAS# (Continued)
DDE, 4,4'-	72-55-9
DDT, 4,4'-	50-29-3
Diazinon	333-41-5
Dibenz[a,h]anthracene	53-70-3
Di-n-butylphthalate	84-74-2
2,3-Dichlorobiphenyl	16605-91-7
Dichlorvos	62-73-7
Dieldrin	60-57-1
Diethylphthalate	84-66-2
Di(2-ethylhexyl)adipate	103-23-1
Di(2-ethylhexyl)phthalate	117-81-7
Dimethylphthalate	131-11-3
2,4-Dinitrotoluene	121-14-2
2,6-Dinitrotoluene	606-20-2
Diphenamid	957-51-7
Disulfoton	298-04-4
Disulfoton sulfoxide	2497-07-6
Disulfoton sulfone	2497-06-5
Endosulfan I	959-98-8
Endosulfan II	33213-65-9
Endosulfan sulfate	1031-07-8
Endrin	72-20-8
Endrin aldehyde	7421-93-4
EPTC	759-94-4
Ethoprop	13194-48-4
Etridiazole	2593-15-9
Fenamiphos	22224-92-6
Fenarimol	60168-88-9
Fluorene	86-73-7
Fluridone	59756-60-4
Heptachlor	76-44-8
Heptachlor epoxide	1024-57-3
2,2',3,3',4,4',6-Heptachloro-biphenyl	52663-71-5
Hexachlorobenzene	118-74-1
2,2',4,4',5,6'-Hexachlorobiphenyl	60145-22-4
Hexachlorocyclohexane, alpha	319-84-6
Hexachlorocyclohexane, beta	319-85-7
Hexachlorocyclohexane, delta	319-86-8
Hexachlorocyclopentadiene	77-47-4
Hexazinone	51235-04-2
Indeno[1,2,3,c,d]pyrene	193-39-5
Isophorone	78-59-1
Lindane	58-89-9
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SVOC (Continued)	CAS# (Continued)
Merphos	150-50-5
Methoxychlor	72-43-5
Methyl paraoxon	950-35-6
Metolachlor	51218-45-2
Metribuzin	21087-64-9
Mevinphos	7786-34-7
MGK 264	113-48-4
Molinate	2212-67-1
Napropamide	15299-99-7
Norflurazon	27314-13-2
2,2',3,3',4,5',6,6'-Octachlorobiphenyl	40186-71-8
Pebulate	1114-71-2
2,2',3',4,6-Pentachlorobiphenyl	60233-25-2
Pentachlorophenol	87-86-5
Phenanthrene	85-01-8
Permethrin, cis-	54774-45-7
Permethrin, trans	51877-74-8
Prometon	1610-18-0
Prometryn	7287-19-6
Pronamide	23950-58-5
Propachlor	1918-16-7
Propazine	139-40-2
Pyrene	129-00-0
Simazine	122-34-9
Simetryn	1014-70-6
Stirofos	22248-79-9
Tebuthiuron	34014-18-1
Terbacil	5902-51-2
Terbufos	13071-79-9
Terbutryn	886-50-0
2,2',4,4'-Tetrachlorobiphenyl	2437-79-8
Toxaphene	8001-35-2
Triademefon	43121-43-3
2,4,5-Trichlorobiphenyl	15862-07-4
Tricyclazole	41814-78-2
Trifluralin	1582-09-8
Vernolate	1929-77-7

Sampling, Packaging, and Handling: Samples must be collected in clean glass containers. 1 L or 1 qt amber glass bottles fitted with Teflon-lined screw caps are highly recommended. The optimal sample volume is two 1 L bottles per site, with a minimum required sample volume of 1 L. For tap water, open the tap and allow the system to flush until the water temperature has stabilized (usually about two minutes). When sampling from an open body of water, fill the sample container with water from a representative

area. If using automatic samplers, they must be free of plastic tubing, gaskets, and other parts that may leach interfering analytes into the sample.

Samples should be preserved with 40-50 mg of sodium sulfite per liter and 6 molar hydrochloric acid until the sample is at a pH < 2. Sodium sulfite should be dissolved before adding acid to lower the pH of the sample. If preservation in the field is not possible, IBL can add preserve samples after they are submitted to the laboratory. If cyanizine is to be determined, a separate sample must be collected. Samples for cyanizine should be maintained at 4 ± 2 °C with no sodium sulfite or hydrochloric acid preservative. If atraton and/or prometon are to be determined, a separate sample must be collected. Samples for atraton and prometon must be maintained at 4 ± 2 °C with 40-50 mg of sodium sulfite but no hydrochloric acid should be added.

Samples should remain sealed from the time of collection until analysis. Samples should be stored and transported at 4 ± 2 °C and kept in the dark.

Section 4.0: Environmental Radiological Analysis

4.1 Gross Alpha and Gross Beta Radioactivity

Synonyms:

Method/IBL SOP: SM 7110B / RD-7110B

Acceptable Matrices: Aqueous Liquids

Analysis Overview: Gross alpha and gross beta particle activities are measured using a gas-flow proportional counting system. This is a rapid screening measurement to indicate if more specific analysis is required. Specific radionuclide measurements that are not performed at IBL would be required if dose estimates are to be made, results of gross analysis exceed a certain level, or if long term trends are being monitored. Cesium radioisotopes, polonium-210, and some chemical forms of radioiodine are not measurable by this method.

Sampling, Packaging, and Handling: Samples must be collected in clean glass or plastic containers. For aqueous liquids, two 1 L samples are recommended, with a minimum sample size of 1 L. In cases involving water samples, the inside of the container should be rinsed with reagent water or water from the source prior to sample collection. Samples must be preserved by bringing the sample to pH < 2 with a minimal amount of concentrated nitric acid (3 mL nitric acid per liter of sample is usually sufficient). If the client is not able to preserve the sample with acid, IBL will preserve samples upon receipt. Samples should be stored and transported at 4 ± 2 °C.

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